loſophy is the ſubject of another fragment, a ſmall buſt of Epicurus, with his name in Greek characters, was found in the ſame room, and was poſſibly the ornament of that part of the library, where the writings in favour of his principles were kept; and it may alſo be ſuppoſed, that ſome other heads of philoſophers, found in the ſame room, were placed with the ſame taſte and propriety.

Laſt week were found two fine bronze heads, of excellent workmanſhip, one of Seneca, and another of a captive king. The king ſpares no expence in recovering and preſerving theſe valuable remains. In order to ſatisfy the curioſity of the public, he has ordered a catalogue to be printed, with ſome deſigns of the principal ſtatues and paintings, which will be publiſhed ſoon. A more exact account of theſe diſcoveries will ſome time or other be given by Monſignor Baiardi, who, in three large quarto volumes already printed, has not finiſhed his introduction.

CIV. *An Account of ſome Trials to keep Water and Fiſh ſweet, with Lime-water.* *By* Stephen Hales, *D. D. F. R. S.*

Read Dec. 19, 1754.

DR. Alſton, of Edinburgh, having found, that the ſmall proportion of a pound of ſlack'd-lime in a hogſhead of water, ſtirring it, effectually preſerved the water ſweet, not only in a glaſs or earthen veſſels, but alſo in a new oaken veſſel, April 9, I put into a ſeven gallon caſk of water, in the proportion of a pound to a hogſhead, ſome white marble lime; which was what they call ſweated, that is wrapp'd in dung, without which ſweating, it is ſaid, that it will not be reduced to lime.

April 26, It had ſome taſte of the wood, and a ſmall degree of ill ſmell, which being ſomething more ſo on July 27, it was then poured away.

June 15, I put into an 18 gallon caſk 18 ounces of unſlacked ſtone-lime, made of very hard ſtone of the Clee-hills in Shropſhire; that is, in the proportion of four pounds and an half of lime to a hogſhead of 72 gallons.

June 25, The water was ſweet, but had a diſagreeable taſte of the caſk, and continued the ſame Auguſt 24; but October 17 the taſte was ſomething worſe. And, November 12, there ſeemed to be a very ſmall degree of a putrid ſmell and taſte. But the prevailing diſagreeable taſte was from the wood of the caſk, which diſcoloured the water in ſome degree.

I put alſo into a nine gallon caſk two ounces of the ſame unſlack'd ſtone-lime to a gallon; which was in the proportion of nine pounds to the hogſhead, and found it much the ſame all along as the former.

With chalk-lime, in the proportion of two pounds to a hogſhead, it ſoon ſtunk much, and continued ſo to do for four months. This was Thames-water, taken up below London-bridge, which is well known to grow ſweet again, after having ſtunk for ſome time. So that chalk-lime (almoſt the only ſort in uſe here), will not preſerve water from putrefaction: though ſtone-lime, as Dr. Alſton has happily diſcovered, does preſerve water in a great meaſure from the great degrees of putrefaction it is ſubject to, and therefore may be very ſerviceable at ſea.

Being informed, by one, who had been in the Eaſt-Indies, that native mineral ſulphur had been found to keep water ſweet there in earthen-jars, at land, and alſo at ſea, (but I know not whether in jars, probably in caſks),

April 2, I put into a kilderkin, or eighteen gallons of pure pond-water, a pound of native mineral ſulphur, in ſeven lumps.

April 16, Sweet.

May 3, Began manifeſtly to ſtink.

May 7, Stunk much, and was poured away.

May 8, The kilderkin being ſcalded, and made ſweet, it was filled again with the ſame pond-water, and ſix pounds of native mineral ſulphur put into it.

July 27, It was ſweet.

October 17, It was diſcoloured, and ſomewhat in a ſmall degree fetid.

November 12, The ſame.

Hence native mineral ſulphur may be of ſervice to preſerve water from great degrees of putrefaction at ſea.

Dr. Alſton having written me word, that he found fiſh would continue ſweet in lime-water for ſeven and more weeks,

April 19, I put four gudgeons into white marble lime-water.

May 10, They were ſweet; but on boiling one of them, the fleſh, though ſweet, was reduced to be ſoft pap.

And

And Monſieur Clairaut, who was at Lapland, to meaſure a degree of the earth, told me on this occaſion, that the fiſh, which they there kept long dried, were thus pappy when boiled, but not unwholſome.

May 22, They ſmelt ſweet, and were firm to the feeling; but, on boiling one of them, it diſſolved away like anchovy.

June 12, Another of the gudgeons, though ſweet and firm to the touch, being put into new-made ſtone-lime-water, which was only milk-warm, diſſolved alſo, and the bones of the head were rotten and brittle.

June 18, Two ſmall eels, ſkinned, were put into ſtone lime-water.

June 22, One of them, which was firm to handle, when boiled was ſoft and pappy.

June 25, The other eel was the ſame when boiled.

In order to try whether the lime, which adhered to, or had ſoaked into, the fleſh of the fiſh, which had lain in lime-water, had the quality of thus diſſolving the texture of the fleſh in boiling, I boiled a ſmall eel, and a morſel of mutton, for ten minutes, in ſtone lime-water, when they were boiled enough, and were of a due degree of firmneſs, and not pappy.

A like eel, boiled in well-water, was boiled enough in five minutes.

Hence it appears, that the lime does not, in boiling ſo ſhort a time, diſſolve the texture of the fleſh into a pap, which muſt therefore be the effect of unfetid putrefaction.

But lime-water made of chalk-lime has very little of an antiſeptic quality.

For laſt year, in the month of May, I put ſome gudgeons, and an eel, into our common lime-water, and in ſeven days boiled one of the gudgeons, but found it too putrid to eat.

After twenty-eight days I boiled another, and it diſſolved almoſt into inſenſible parts; which ſhews, that it was much putrefied.

Dr. Alſton likewiſe informed me, that he put a piece of veal in pounded or ſlack'd ſtone-lime, which in a week became tough and dry. I put a piece of veal, from half to three-quarters of an inch thick, into chalk-lime, on May the 10th, and on the 31ſt of the ſame month it had a putrid ſmell, and was in the middle red and raw, with a thin hard outſide.

Having communicated theſe experiments to Dr. Pringle (whoſe trials having been made with chalk lime-water, which is in common uſe here, agreed with the laſt of mine), he obſerved, that the difference between ſtone-lime-water and chalk-lime-water might probably conſiſt in this: The chalk, before calcination, being a highly ſeptic ſubſtance *, if ſome of its particles were not fully calcined, theſe, by mixing with the water, would impart to it ſome degree of a putrefying quality, contrary to that virtue the water receives from ſuch parts, as are ſufficiently burnt. That the ſame would be the caſe of ſhells, alſo ſeptics; and therefore that the lime-water, made either of chalk or ſhells, would prove more or leſs antiſeptic, or even continue ſeptic, accord-

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* Obſerv. on the diſeaſes of the army, 1ſt Ed. p. 390.

ing to the degree of calcination. He added, that as all his experiments relating to the antiſeptic quality of lime-water were made in a furnace, heated to the degree of human blood, a circumſtance, which he had marked in his Obſervations *, the uncalcined parts of the lime would in that ſtate become more active in promoting putrefaction, than when the trials were made in cold water.

And indeed it muſt be owned, that when any experiments are made on medicinal ſubſtances out of the body, the nearer we can make them to the heat of the blood, and to other circumſtances thoſe ſubſtances muſt undergo in the firſt paſſages, the more juſt the inferences will be, that are drawn from thoſe experiments.

In regard to that quality of lime-water, in preſerving fiſh longer ſweet than fleſh, Dr. Pringle took notice, that he doubted it was a common miſtake to account fiſh a more corruptible ſubſtance than the fleſh of land animals. For although fiſh might become ſooner ſtale for eating than moſt fleſh-meats, yet that fiſh did not ſo ſoon riſe to a rank degree of putrefaction as fleſh; and therefore that the former would be kept longer tolerably ſweet than the latter by any kind of antiſeptic.

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* To one of the experiments preceding that upon the lime-water, the author ſubjoins the following note: "All the following "experiments, whether made in the lamp-furnace, or by the fire, "were in a degree of heat equal to that of the human blood, "viz. 100 deg. of Fahrenheit's ſcale." p. 383.